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FLIGHT CONTROL™ AS A GRAZING REPELLENT FOR CANADA GEESE AT PORTLAND INTERNATIONAL AIRPORT

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Abstract

The anthraquinone formula marketed as Flight Control™ (FC) is advertised as a goose repellant with both an ultraviolet and post-ingestional repellency when applied to turf. Two studies have been conducted with FC, one at the National Wildlife Research Center in the U.S., and one at the Mumbay, India airport, but neither included the information necessary to determine if it is practical to use at Portland International Airport (PDX).

The Port of Portland wanted to determine: 1) If FC is effective in deterring geese from grass. 2) Whether geese will avoid the entire project area or just the treated plots. 3) How long FC will last in our rainy climate. 4) If geese will avoid the test plots after the product has reduced in concentration. 5) Whether the product effects non-target species. 6) Whether FC will have any negative effect on treated grass. 7) If FC is a cost-effective way to reduce birdstrikes at PDX.

A field with heavy goose activity was divided into five transects, which were monitored morning and afternoon for 13 weeks. Two test plots, which had goose activity 65 percent of monitoring events, were selected for application. The product was then sprayed using a mixture of one-half gallon FC, five gallons of water, and eight ounces of an agricultural sticker. This was applied at a rate of one-half gallon per acre.

Monitoring continued twice a day with the following results. Geese were not observed in the treated areas for the first 10 days. After 10 days, geese were present in the treated plots five of the next 11 days, or 21 percent of monitoring events. Total post-treatment monitoring showed that goose activity in treated areas rose gradually each week, but continued to be lower than in control areas.

Our test results showed that Flight Control could be used as a goose deterrent on turf with marked avoidance of treated areas. For airports with heavy rainfall, the effectiveness of the product may diminish after 10 days. We also found that geese did not avoid the entire project site, only the treated plots. In addition, goose activity in treated areas, after the product had decreased in concentration, was only slightly lower than in untreated areas. There were no observed effects to non-target birds, and no adverse effects on treated grass.

In conclusion, Flight Control can be used to deter geese from specific areas for as long as the concentration of the material lasts. It did not, however, cause geese to learn to avoid the treated areas in our test. Research into making the chemical longer lasting would increase its cost-effectiveness.

Key Words: Portland International Airport, USA, Vegetative attractant, Canada Goose, Chemical repellent, Visual repellent

I. Introduction

Geese pose a serious concern for airports worldwide. Their large body size and flocking behavior increase the odds that a goose strike will damage an aircraft (Transport Canada 1996). In fact, the Federal Aviation Administration has rated goose strikes at a relative hazard of 52 out of 100, based on the likelihood that a strike will be damaging (Cleary & Dolbeer 1999).

The International Civil Aviation Organization database shows that the number of goose strikes worldwide is increasing every year. Over 120 strikes were reported in 1997 alone, involving five different goose species (ICAO 1997).

One significant cause of the increased number of strikes is that the population of geese is rising dramatically in many regions. In addition, many geese have become resident in urban areas. The United States Department of Agriculture (USDA) population count shows that the number of resident geese in North America has risen from approximately 200,000 in 1970 to over 2,000,000 in 1997, a tenfold increase (Alge 1999). These statistics show the urgent need for an effective means of keeping geese away from airports.

A. Problem

Geese prefer grazing on short, fertilized grass in open areas. They also utilize standing water (Transport Canada 1999). These are all prominent features on and around the airfield at Portland International Airport (PDX) during the late

fall and winter months. Therefore, PDX has always attracted geese to its short grassy infields, wetlands, and wide open tracts of undeveloped land. In addition, PDX is along a major west coast migratory flyway for geese. All of these factors create an environment that is inherently attractive to geese.

Records show that there have been 9 goose strikes at PDX between 1987 and 1999. One of these strikes required an emergency landing due to a punctured radome (Port of Portland 1987-1999).

Current harassment techniques at PDX include hazing with vehicles, sirens, pyrotechnics and propane cannons. These methods are effective, but only for short periods of time. Within a few hours, geese are seen returning to hazed areas. Due to the number of geese in the area, any lethal means of control would have to be continuous, which would be expensive, time consuming, and unpalatable to the public. Clearly, a long-term solution is needed to make the area less attractive to geese.

B. Solution: Flight Control

A product that could be used to repel birds from grazing would be a valuable tool in the management of geese at PDX and other airports. Flight Control is marketed as this product.

Flight Control (FC) is a chemical compound that contains 50 percent anthraquinone and 50 percent inert ingredients. It is marketed as a chemical to be applied to turf where geese are grazing. There is a two-part repellency to the product:

1. Anthraquinone is a post ingestional irritant, meaning that it causes birds to feel unwell after eating treated grass. The chemical does not harm birds, however.
2. There is also a visual repellency to FC. Research by Richard Dolbeer of the USDA shows that birds can see FC in the ultraviolet range (Ballinger, Gilmore & Price 1999). When the geese fly over an area treated with FC the grass appears discolored and unappealing. (See Figure 1.)

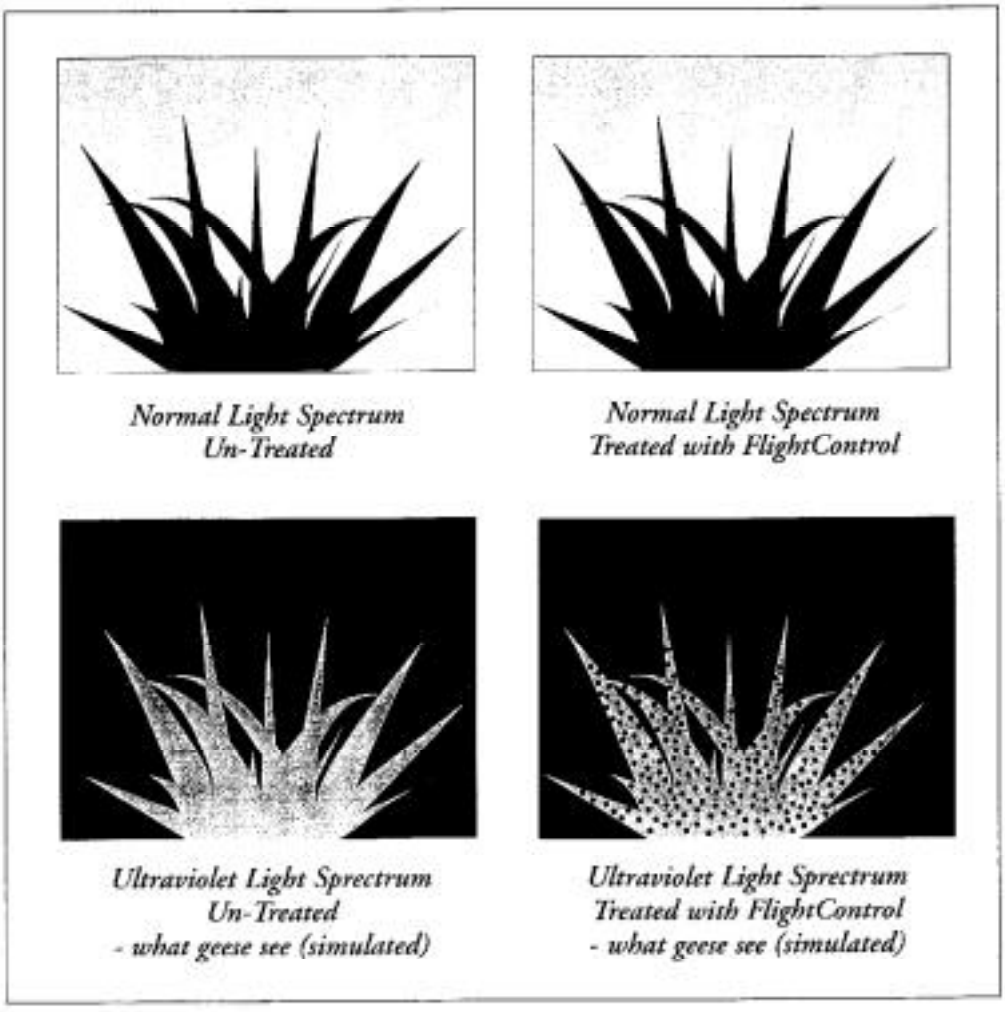
The combination of these two repellent factors is what gives Flight Control its effectiveness. After geese have had the experience of feeling sick from ingesting FC, they will make the connection between the sickness and the visual effect of FC. Later, they will avoid areas that they can see are treated to avoid the ill feeling (EBI & Lesco 1999).

Figure 1

FLIGHTCONTROL®

The UV Factor

Geese have the unique ability to see in the ultraviolet (UV) spectrum of light in addition to the normal spectrum that humans see in. They have vision in both spectrums, almost simultaneously. It is the UV spectrum in which they see FlightControl® on the turf. The appearance of the compound appears so unnatural and uninviting, geese avoid the area. Combine the UV factor with the intestinal reaction they experience if they do sample the turf, and the geese are quickly conditioned to stay away!



Normal Light Spectrum Un-Treated

Normal Light Spectrum Treated with FlightControl

Ultraviolet Light Sprectrum Un-Treated - what geese see (simulated)

Ultraviolet Light Sprectrum Treated with FlightControl - what geese see (simulated)

II. Test preparation

A. Test Objectives

Two tests have been conducted with Flight Control™, a pen trial by USDA (Lesco 1999) and a test at the Mumbay, India airport (GDB 1999). Both of these tests provided valuable information about how the product works, but neither gave long-term data on migrating goose behavior around treated plots

To determine if FC will be effective in deterring geese from PDX, a test was conducted to answer the following questions:

1) Is FC effective in deterring geese from grazing on grass?
2) Will geese avoid the entire project area or just the treated plots?
3) How long will FC last in our rainy climate?
4) Will geese exhibit long-term avoidance of the test plots after the product has reduced in concentration?
5) Will FC effect non-target species?
6) Will FC have any negative effect on treated grass?
7) Is FC a cost-effective way to reduce birdstrikes at PDX?

B. Test Site

To determine the effectiveness of Flight Control for use at PDX, a 50-acre test site was selected near the airfield that has a history of goose activity. This field has flocks of 300 of more Canada geese grazing and nesting in it during the fall and winter months. This area is also of concern because it lies 4000 feet from runway 10R/28L, which puts birds directly in the approach and departure paths of aircraft.

The test site is an open, grassy field used primarily for livestock grazing. A vegetation survey was conducted at the test site to determine if there were significant variations in the vegetation that may effect the test. The survey determined that there was consistency among the vegetation throughout the site. (See Appendix A for vegetation survey.)

The only concern was a small pond in the northeast corner of the site, which may be more attractive than other features. It was determined that the pond would be divided among two different plots, one a test plot and the other a control plot. This way, the data collected would not reflect the added attractiveness of the pond.

C. Pre-Treatment Monitoring

Before the application of FC, the test site was divided into five plots of between eight and 12 acres each. These plots were monitored from October

28 to November 29, 1999. (See Figure 2 for map of plots.) Twice each day the field was surveyed for information on weather conditions, air traffic direction, numbers of geese, activities of geese, location of geese, and notes on any other wildlife or abnormal activity. This was done so that comparisons could be made between pre-and post-application behavior. A sample of the data sheet is shown in Appendix B.

D. Test Plot Selection

Using the data compiled between October 28th and November 29, 1999, two areas were chosen as test plots because they had the highest occurrence of goose activity. Plots 2 and 5 were selected, as geese were present in these areas 65 percent of the time they were monitored. The other test plots had goose activity 35 percent of the time, and were used as control plots.

III. Product application

Flight Control comes in liquid form. The day of the application, it was mixed to a dilution of _ gallon FC to 5 gallons of water in a 25 gallon tank. Eight ounces of an agricultural sticker called SylTac was also added and mixed in before spraying began. (It is recommended that a sticker be used in combination with FC to assure maximum adherence to the grass blades [Knauer 1999]).

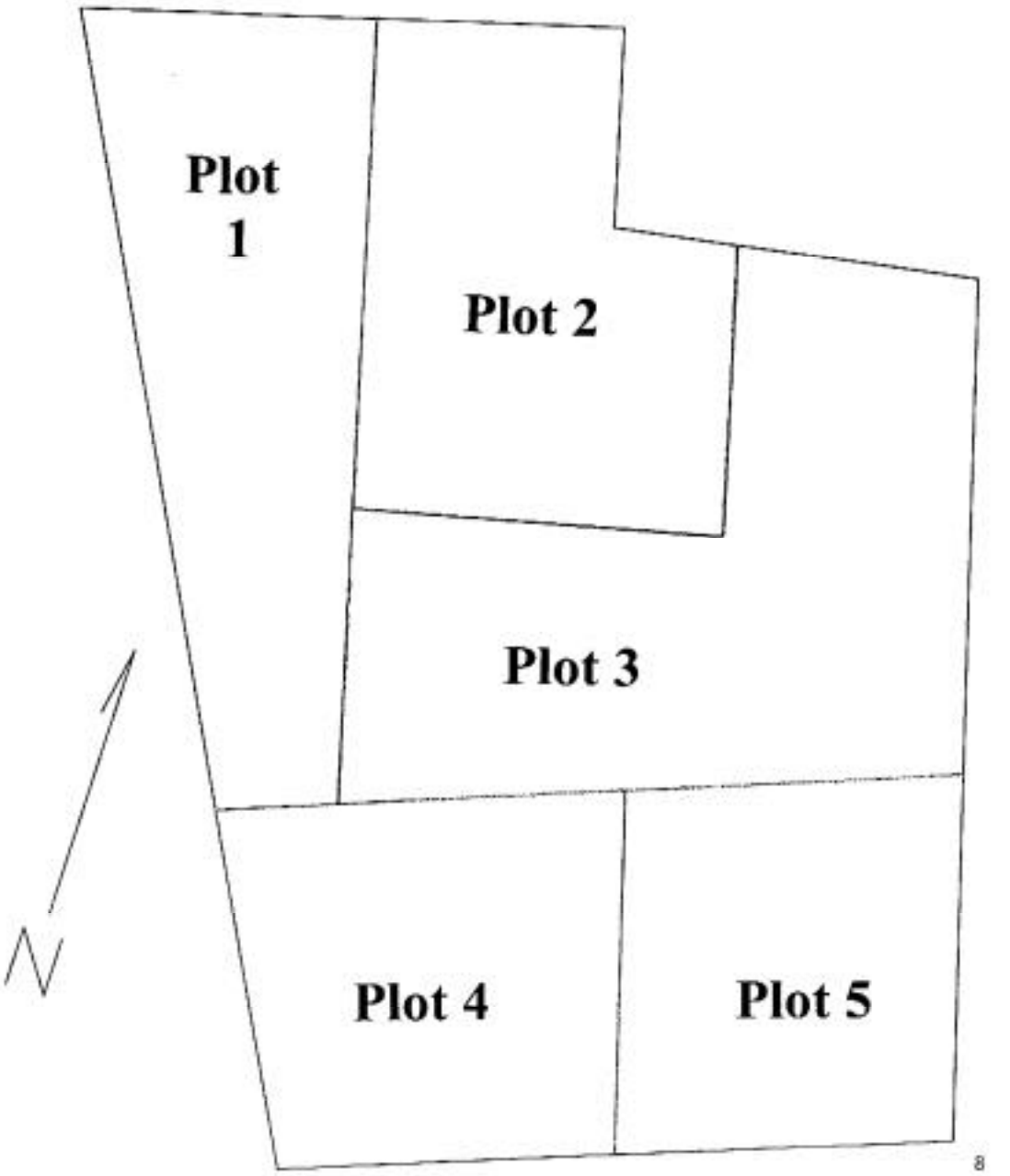
FC was applied with a 12-foot spray boom, mounted on the back of an all terrain vehicle (ATV). The product was applied to the turf at a rate of one half gallon FC per acre. The rate of application was controlled by the speed of the ATV. Treatment was started on the northern test plot, which was completely treated on the morning of November 29, 1999. Treatment of the southern plot was also started at this same time. After one third of this plot was treated, rain caused the treatment to be postponed until the morning of December 3, 1999. The untreated portion of the field was considered a control area until the application was completed.

IV. Results

After the application of FC to the test plots, daily monitoring continued using the same parameters as pre-treatment monitoring. The monitoring was done twice a day, once in the morning and once in the afternoon.

Figure 2

33rd Field Plot Locations



A. Week One
During the application of Flight Control in plot two, 300 European starlings were seen feeding on the freshly sprayed vegetation. Soon after they began feeding, the flock left the treatment area and did not return to the test plot. The same morning, 320 Canada geese were seen flying over the test site, but did not land. On the morning of November 30, 450 Canada geese were noted in control plot 4 and in the untreated part of plot 5. There were also 50 geese that flew over the test site. The rest of first week, geese were observed in untreated plots only (two times), and starlings were observed feeding in treated plots twice.

B. Week Two
In the second week of the test, the negative effect of FC was observed. During afternoon monitoring on the 10th day after treatment, 300 geese were seen straddling the boundary between treated plot 2 and control plot 3. These geese were observed moving completely into plot 2 and starting to feed on treated vegetation. After grazing for a few minutes, the whole flock exited plot 2 and moved into an area of plot 3 where there was standing water. All of the geese were trying to gain access to the water. They did not return to plot 2. Four mallard ducks were also observed moving from a treated area to the untreated area with the standing water. This was the only observation of geese in any of the plots for the week.

C. Week Three
In week three, we began to see some goose activity in the treated plots, beginning on day 15. Early in the week, flocks of 130 to 300 were seen feeding in treated plot 2. Toward the end of the week, 1000 geese were observed feeding in treated plot 5. During this time, other species observed in the treated areas included starlings, crows, and ducks.

D. Week Four and Beyond
In weeks four through eight, there was goose activity in both of the treated plots, though the activity stayed lower than in control areas. As the weeks continued, activity in treated plots increased. (See Appendix C for a weekly breakdown of goose activity in treated plots.) Other birds seen feeding in treated plots included starlings, killdeer, mallards, flickers, widgeon, and crows. None of the non-target species were observed to suffer any ill effects of ingesting the chemical.

Figure 3 shows the percent of geese feeding in treated plots before and after FC was applied. The product was applied in Week 6. Goose avoidance of the area can clearly be seen following the application. This avoidance diminished over time.

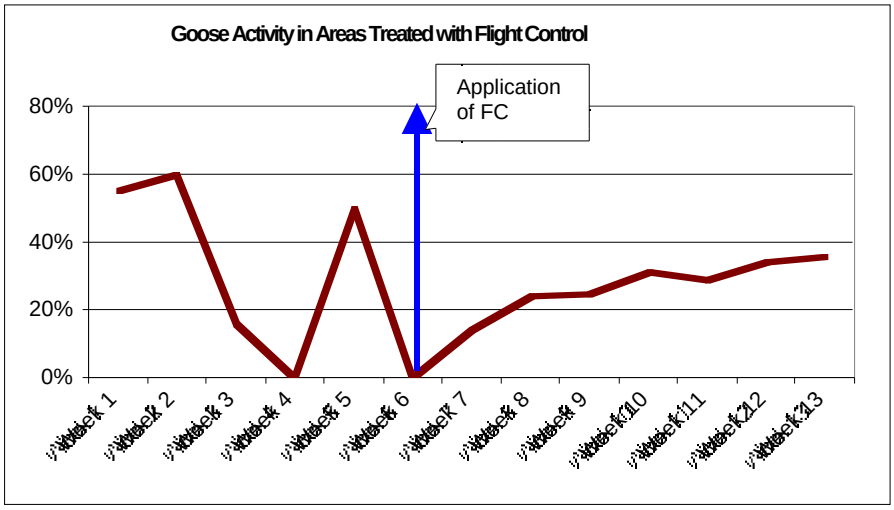


Figure 3: Weekly percentages showing how often geese were observed in areas treated with FC.

V. Discussion

Before application of FC to the test plots, geese were observed in the test plots 65 percent of the time. After FC was sprayed, goose activity decreased dramatically for the first eight weeks, gradually rising from zero percent in week one to 36 percent in week eight.

After the test was concluded, we analyzed how the test answered the questions in our objectives:

1. Is FC effective in deterring geese from grass?
   A marked decrease in grazing geese was observed in the test plots after the product was sprayed. This effectiveness decreased over time. Behavior was also observed that showed that geese had an adverse reaction to treated grass.

2. Will geese avoid the entire project area or just the treated plots?
   Geese were observed in the untreated control plots the day after the application and throughout the test. Therefore, the product will not deter geese from an entire area, only from the treated plots.

3. How long will FC last in a rainy climate?
   Geese avoided the treated areas until 15 days had passed, during which PDX had rain nine of the 15 days. After 15 days, geese were seen feeding on treated grass with no avoidance reaction.

4. Will geese exhibit long-term avoidance of test plots after the product has reduced in concentration?
   Geese did not avoid treated areas after the concentration had diminished due to rain and time. After 15 days, they were feeding in areas that had been treated. The application of the product did not cause them to learn to avoid the test plots.

5. Will FC effect non-target species?
   Throughout the test, starlings were observed feeding in the treated plots on many days. Other birds occasionally seen feeding in treated plots included killdeer, mallards, flickers, widgeon, and crows. Though FC did not seem to deter them from the treated areas, it also did not have an adverse effect on any of these species.

6. Does FC have any negative effect on treated grass?
   No discoloration or other negative effect was observed on treated grass.

7. Is FC a cost-effective way to reduce birdstrikes at PDX?
   We found FC easy to apply and simple to use. It had no negative effects on the wildlife in the test site, nor on the grass we treated. PDX has so much acerage of turf, however, that spraying FC every few weeks in all areas where geese are grazing would be cost-prohibitive. It is practical to use, however, in specific problem areas that are highly attractive, such as wetlands, newly hydroseeded areas, etc. We may also use it in critical areas, such as near runways and taxiways. We consider FC another tool to consider when determining the best method of deterring geese from an area.

VI. Conclusions and recommendations

The results of this test show that Flight Control is an effective grazing repellent for Canada geese. Behavior of geese after they had eaten treated vegetation showed that they had an aversion to the FC. This repellency was extremely effective following the application, but decreased over time. Airports with heavy rainfall may find that the product is only effective for 15 to 20 days.

Research is currently being conducted on various kinds of adhesive agents which can be mixed with FC to make it last longer (Knauer 2000). The outcome of this research may make FC a more cost-effective tool for airports to use. Nevertheless, airports can use FC as a tool to deter geese from areas of turf that are highly attractive, or near aircraft flight paths. FC is an encouraging product in the control of geese at airports.

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Appendix A

VEGETATION SURVEY AT 33RD FIELD

By Kelly Navalinski, Noel Lyman and Carrie Stevenson

September-October 1999

AREA # 1 (see attached map)

Scientific Name	Common Name
Chenopodium album	Lamb's Quarters
Cirsium arvense	Canada Thistle
Gnaphalium spp.	Cudweed
Juncus spp.	Rush
Plantago lanceolata	English Plantain
Polygnum aviculare	Prostrate Knotweed
Rumex crispus	Curly Dock
Rumex occidentalis	Western Dock
Taraxacum spp.	Dandelion
Trifolium repens	White Clover
	Grass (3 species)

AREA # 2

Scientific Name	Common Name
Anthemis cotula	Stinking Chamomile
Capsella bursa-pastoris	Shepherd's Purse
Cichorium intybus	Bachelor's Button/ Chicory
Cirsium arvense	Canada Thistle
Cirsium vulgare	Bull Thistle
Convolvulus arvensis	Field Bindweed
Geranium spp.	Geranium
Gnaphalium spp.	Cudweed
Juncus spp.	Rush
Leucanthemum vulgare	Oxeye Daisy
Matricaria discoidea	Pineapple weed
Plantago lanceolata	English Plantain
Plantago major	Broadleaf Plantain
Polygonum persicaria	Lady's Thumb
Rubus discolor	Himalayan Blackberry
Rumex occidentalis	Western Dock
Solanum dulcamara	Climbing Nightshade
Taraxacum spp.	Dandelion
Trifolium pratense	Red Clover
Trifolium repens	White Clover

AREA #3

Scientific Name	Common Name
Anthemis cotula	Stinking Chamomile
Chenopodium album	Lamb's Quarters
Cichorium intybus	Bachelor's Button/ Chicory
Cirsium arvense	Canada Thistle
Cirsium vulgare	Bull Thistle

Appendix A (continued).

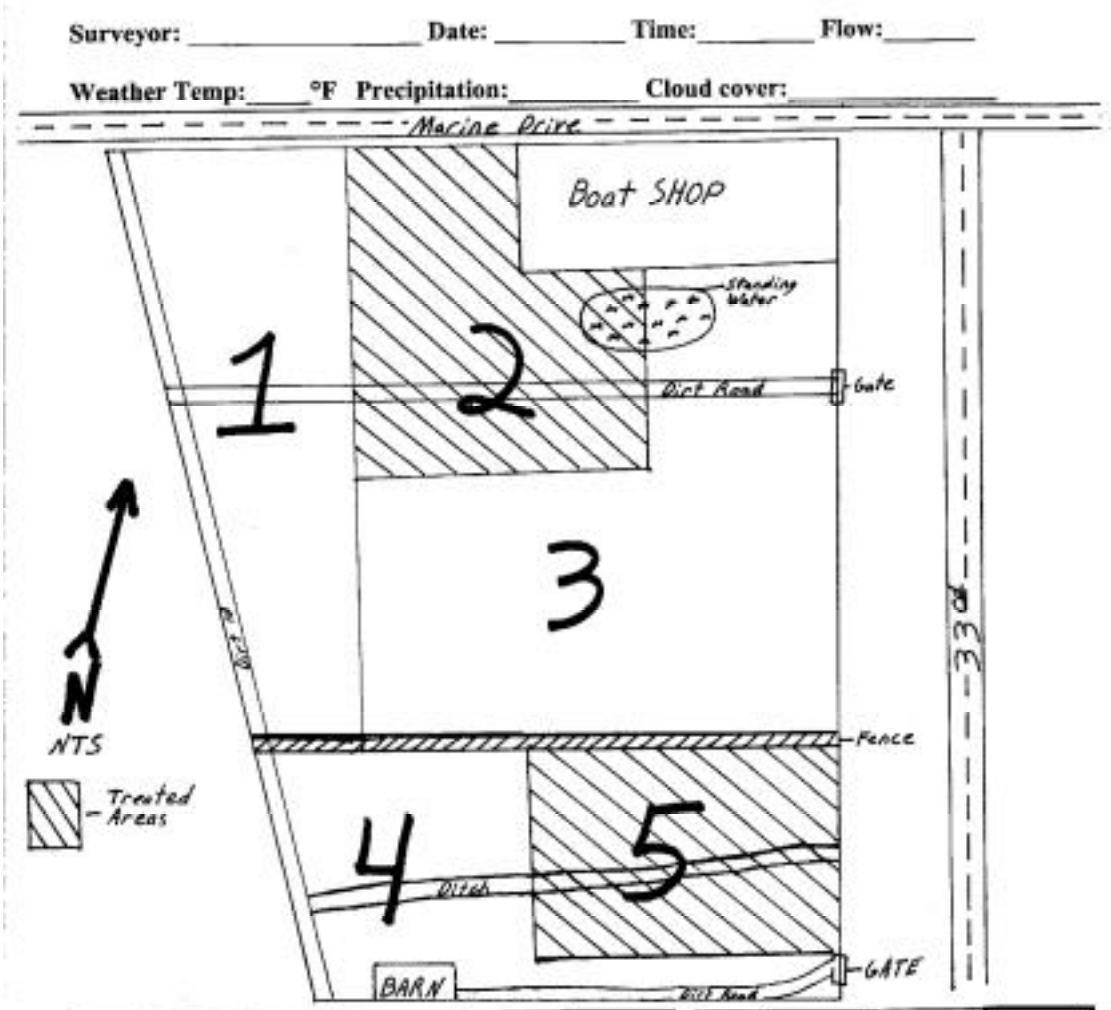
Appendix A

Gnaphalium spp.	Cudweed
Matricaria discoidea	Pineapple weed
Phalaris arundinacea	Reed Canary Grass
Plantago lanceolata	English Plantain
Plantago major	Broadleaf Plantain
Rorippa spp.	Yellowcress
Rumex acetosella	Sheep Sorrel
Rumex crispus	Curly Dock
Rumex occidentalis	Western Dock
Senecio Jacobea	Tansy Ragwort
Tanacetum spp.	Tansy
Taraxacum spp.	Dandelion

AREA #4

Scientific Name	**Common Name**
Polygonum persicaria	Lady's Thumb
Polygonum hydropiper	Marshpepper smartweed
Gnaphalium spp.	Cudweed
Trifolium pratense	Red Clover
Alopecurus spp.	Foxtail (grass)
Senecio Jacobea	Tansy Ragwort
Juncus effusus	Common Rush
Cirsium arvense	Canada Thistle
Polygonum hydropiperoides	Mild Waterpiper
Rumex occidentalis	Western Dock

Appendix B.



Plot	% Eating	% Lying Down	% Standing	% Flying Over	TOTAL
#					
#					
#					
#					
#					

For Canada Geese

Plot	Other Species	Current Action	TOTAL
#			
#			
#			
#			
#			

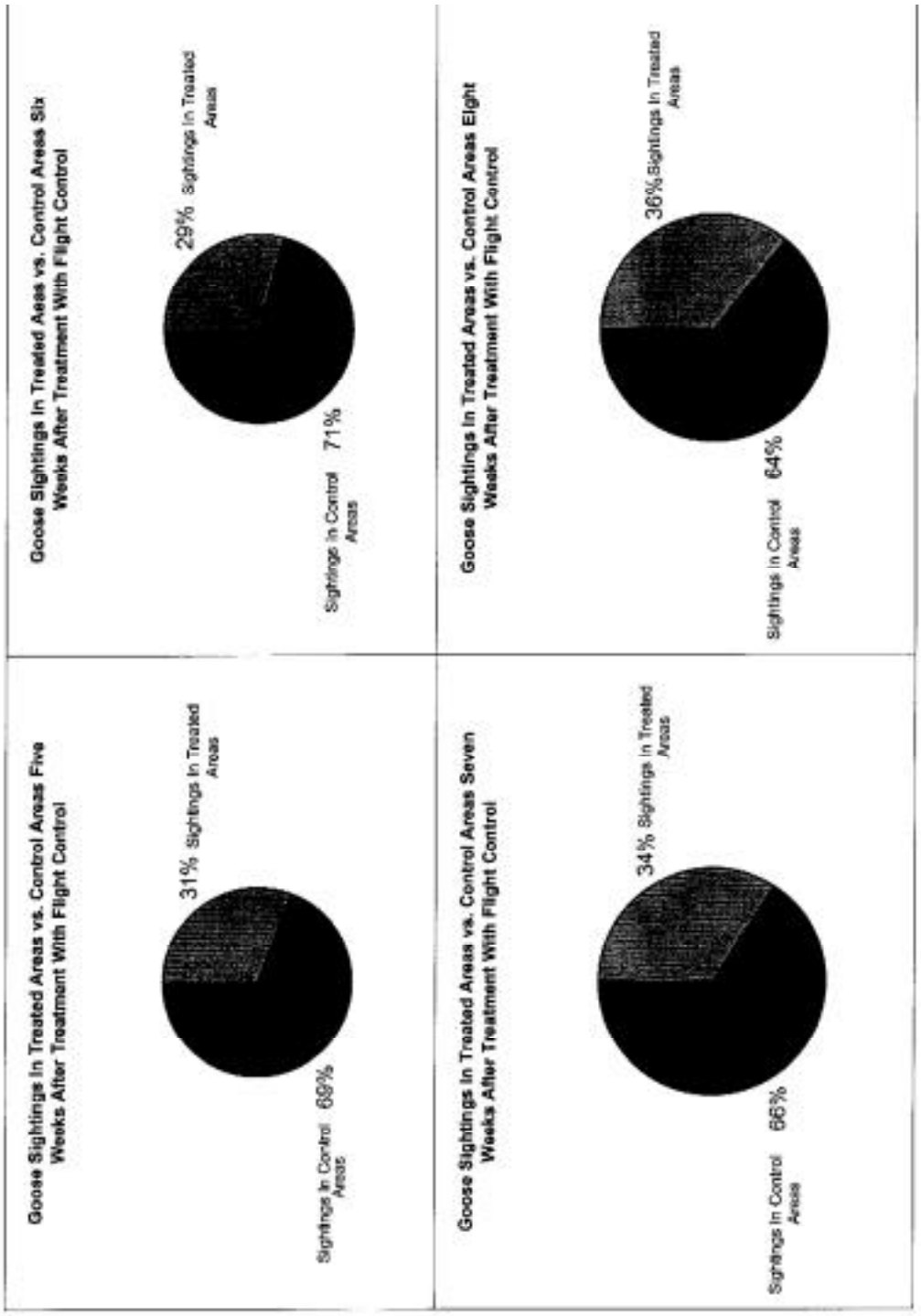
For Other Species

☐ Check If Any Additional Observations On Reverse Side.

Appendix B 17

Appendix C.

Appendix C



Appendix C (continued).

Appendix C